

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
30 August 2001 (30.08.2001)

PCT

(10) International Publication Number
WO 01/63075 A1

(51) International Patent Classification⁷: E05B 15/02, 47/00, 65/12

(21) International Application Number: PCT/CA01/00182

(22) International Filing Date: 15 February 2001 (15.02.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/184,042 22 February 2000 (22.02.2000) US

(71) Applicant (for all designated States except US): ATOMA INTERNATIONAL CORP. [CA/CA]; 521 Newpark Boulevard, Newmarket, Ontario L3Y 4X7 (CA).

(72) Inventors; and

(75) Inventors/Applicants (for US only): OXLEY, Peter, Lance [CA/CA]; 18372 9th Line, R.R. #3, Mount Albert, Ontario L0G 1M0 (CA). PATON, Gordon, Andrew [CA/CA]; 1 Ramsden Crescent, Sharon, Ontario L0G 1V0 (CA).

(74) Agent: IMAI, Jeffrey, T., Imai; Magna International Inc., 337 Magna Drive, Aurora, Ontario L4G 7K1 (CA).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

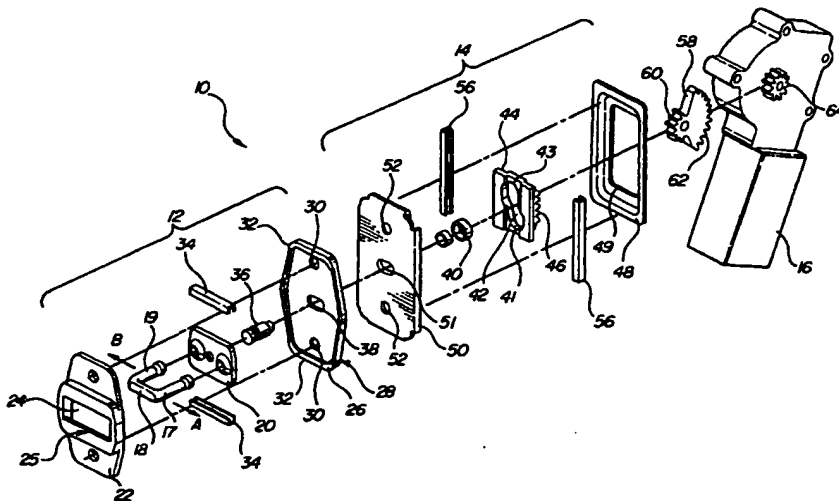
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: POWER STRIKER MECHANISM WITH BACKDRIVE PREVENTION



(57) Abstract: A power striker mechanism (10) has a housing (22). A striker (18) is mounted on a striker plate (20) that is mounted on the housing for sliding movement between an inboard and an outboard position. A driver plate (44) is mounted to the housing for sliding movement in a direction orthogonal to the movement of the striker plate (20). An actuator (16) effects movement of the driver plate (44) to thereby effect movement of the striker plate (20) between the inboard and outboard positions. The striker plate (20) has a pin (36) and the driver plate has an S-shaped slot (42). The pin slidably engages the S-shaped slot. The S-shaped slot has end regions extending generally parallel to each other and in the orthogonal direction and is interconnected by a diagonally extending section. When the pin (36) is in the end regions of the S-shaped slot, forces imparted on the striker plate (20) are transmitted to the housing (22) and thereby preventing backlash of the actuator (16). When the pin (36) is in the diagonally extending section, movement of the driver plate (44) effects movement of the striker plate (20).

POWER STRIKER MECHANISM WITH BACKDRIVE PREVENTION

Field of Invention

5 The subject invention relates to a power striker mechanism for use with a closure panel of a motor vehicle.

Background of the Invention

10 A vehicle closure panel, such as a door, hood or deck, typically includes a seal to prevent exterior environmental elements from intruding into a passenger compartment. The seal also reduces the amount of exterior noise transmitted into the passenger compartment. Seals with higher stiffness coefficients and greater seal pressures are being used to accommodate consumer demand for a quieter passenger compartment. In other words, new seals are becoming much stiffer than those
15 traditionally used. As appreciated, a stiffer seal translates into an increase in force required to completely close the closure panel.

 One solution to this problem is the use of a power striker, including the power strikers disclosed in United States patent nos. 5,172,947; 4,739,585; 4,982,984; 5,716,085; 5,755,468; 4,842,313; 4,775,178; 4,707,007; 5,765,886; and 5,066,056.
20 During operation of these typical devices, the closure panel is moved to an initial closed position such that the latch engages the striker. The striker is then moved inboard by a power actuator to cinch the closure panel to a final closed position compressing the seals.

 One shortcoming of such a mechanism is the vulnerability to damage of the
25 power striker by excessive slamming of the closure panel, typically a door. A slammed door causes damage because the striker is driven inboard of the vehicle and inertial forces of the door are subsequently transmitted through the striker to the power actuator. Repair and replacement of power actuator is complicated by the confined mounting locations required of such mechanisms.

30 It is thus desirable to develop a powered striker mechanism that is not susceptible to damage by a slamming vehicle closure panel.

Summary of Invention

The disadvantages of the prior art may be overcome by providing a power striker that isolates the actuator from slamming loads imparted to the striker assembly.

According to one aspect of the invention, there is provided a power striker mechanism having a housing. A striker is mounted on a striker plate that is mounted on the housing for slidable movement between an inboard and an outboard position. A driver plate is mounted to the housing for slidable movement in a direction orthogonal to the striker plate. An actuator effects movement of the driver plate to thereby effect movement of the striker plate between the inboard and outboard positions. The striker plate has a pin and the driver plate has an S-shaped slot defining a camming relation. The pin slidably engages the S-shaped slot. The S-shaped slot has end regions extending in the orthogonal direction and is interconnected by a diagonally extending section. When the pin is in the end regions of the S-shaped slot, forces imparted on the striker plate are transmitted to the housing and thereby preventing backlash of the actuator. When the pin is in the diagonally extending section, movement of the driver plate effects movement of the striker plate.

According to another aspect of the invention, there is provided a power striker mechanism. The striker plate and the driver plate are connected together in a camming relation having end phases corresponding to inboard and outboard positions of the striker plate. In the end phases, corresponding to the inboard and outboard positions, the striker plate and the driver plate are coupled to the housing of the mechanism. In an intermediate phase intermediate the end phases, the striker plate and the driver plate are uncoupled from the housing enabling the relative sliding movement of the striker plate and the driver plate.

25

Brief Description of the Drawings

Advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Figure 1 is an exploded view of a powered striker mechanism of the present invention;

Figure 2 is a perspective view of the assembled powered striker mechanism of Figure 1;

Figure 3 is a perspective view, partially in section, of the striker assembly of Figure 1; and

5 Figure 4 is a perspective view, partially in section, of a driver assembly for the powered striker mechanism of Figure 1.

Detailed Description of the Preferred Embodiment

Referring to the Figures wherein like numerals indicate like or corresponding
10 parts throughout the several views, a power closure panel striker mechanism is generally shown at 10 in Figures 1 and 2. The power striker mechanism 10 comprises a striker assembly 12, a driver assembly 14 and an actuator 16.

Referring to Figures 1 and 3, the striker assembly 12 includes a striker plate 20. The striker plate 20 has three aligned holes, with a center hole sized for mounting
15 a driver pin 36. A striker 18, which is U-shaped with outboard 17 and inboard 19 legs, is fixedly attached in the outermost holes of the striker plate 20. The striker plate 20 is slidingly disposed within a cavity 24 of a striker housing cover 22. The striker correspondingly 18 extends through a rectangular opening 25 in the striker housing cover 22.

20 The striker housing cover 22 fits within a peripheral rim 26 of a backplate 28. The striker housing cover 22 has two countersunk mounting holes 30 through which two mounting screws (not shown) are inserted to secure the striker assembly 12 to the vehicle. The backplate 28 secures the striker housing cover 22 at a top and bottom portion by a lip 32 folded over the striker housing cover 22. The pin driver 36 extends
25 through a slot 38 in the backplate 28. Further, the backplate 28 cooperates with the striker housing plate 22 to define a first cavity therebetween. Preferably, striker housing cover 22 has a transverse embossment which receives and secures striker bushings 34 above and below the striker plate 20 within the striker housing cover 22 defining a first channel. The striker bushings 34 are held firmly between the striker
30 housing cover 22 and the backplate 28. The striker bushings 34 allow an inboard and outboard sliding movement of the striker plate 20 in the direction of arrows A, B. As

appreciated, the driver pin 36 and striker 18 are also limited to horizontal movement along with the striker plate 20.

The driver pin 36 fits within a roller 40 disposed within the driver assembly 14, which is also shown in Figure 4. The roller 40 follows within a cam slot 42 of a driver plate 44 in a camming relation.

The driver plate 44 is rectangular having the cam slot 42 and a set or series of gear teeth 46. The cam slot 42 has an S-shaped profile defined by three phases. The end phases comprise outboard 41 and inboard 43 ends and an intermediate phase comprising a diagonal connection therebetween. Outboard end 41 and inboard end 43 extend parallel to each other and generally orthogonal to the inboard outboard movement of the striker plate 20.

A driver housing plate 48 has rectangular aperture 49 which enables the operative engagement between the actuator 16 and the drive plate 42. Preferably, driver housing plate 48 has a rectangular embossment.

The cover 50 includes upper and lower tabs 54 that are folded over the driver housing plate 48 to secure the driver assembly 14 and define a second cavity therebetween. The cover 50 has an aperture 51 through which the pin 36 extends. A pair of driver bushings 56 are mounted within the second cavity to define a second channel. The driver plate 44 slides within the second channel defined by the driver bushings 56 in a direction perpendicular to the inboard outboard movement of the striker plate 20.

The gear teeth 46 of the driver plate 44 engage a sector gear 58. The sector gear 58 is mounted to the support bracket 66 and has a first set of gear teeth 60 that engages the driver plate 44 and a second set of gear teeth 62 that engages a pinion 64 of the actuator 16.

Referring to Figure 2, the actuator 16 is mounted to an internal support within the vehicle. A support bracket 66 is a rectangular plate having an opening for the drive gear 64 and is secured to the actuator 16 to provide a mounting location for the sector gear 58. The sector gear 58 is pivotally attached to the support bracket 66. The sector gear 58 transmits rotary motion of the drive gear 64 to the driver plate 44 and acts as a lever arm to multiply torque provided by the motor 16. The position of the

striker 18 may be adjusted laterally while maintaining engagement of the driver plate 44 to the sector gear 58 due to extra width provided in the driver gear teeth 46.

The subject power striker mechanism 10 is configured to prevent transmission of impact forces on the striker 18, by a slammed closure panel, back through the driver assembly 14 and to the gear motor 16. An impact force imparted on the striker 18 will be in an inboard outboard direction.

The operation of the power striker mechanism 10 begins once the vehicle closure panel is moved to an initial closed position and the latch on the vehicle closure panel, typically a door, hood or deck, has latched onto the striker 18. The actuator 16 is energized to rotate the drive gear 64 that in turn rotates the sector gear 58. The rotation of the sector gear 58 forces the driver plate 44 to slide. The driver plate 44 engages the roller 40, responsively moves the roller 40 along the outboard end 41 and then diagonally towards the inboard end 43 and then along the inboard end 43. The drive pin 36, which engages the roller, responsively transmits the inboard movement to the striker plate 20 and striker 18, causing the striker 18 to move inboard (Arrow A) and pull the vehicle closure panel to a final closed position.

When the closure panel is opened, the process is reversed to move the striker 18 back to the initial closure panel closed or outboard position (Arrow B).

When a closure panel is slammed shut or other external force applied, such as a collision, a force is exerted on the striker 18 in an inboard direction (Arrow A). As appreciated the force is transmitted from the striker 18 through the striker plate 20 and thereby to the driver pin 36. The driver pin 36 then impacts a side of the cam slot 42 of the driver plate 44. When the driver plate 44 is at either end of travel, pin 36 will be positioned at either the outboard end 41 or the inboard end 43. The outboard end 41 and the inboard end 43 both extend transversely to the direction of movement of the striker plate 20. Thus, when pin 36 is in either of the inboard end 43 or the outboard end 41, the striker plate 20 and the driver plate 44 are coupled to the housing. Intermediate of the inboard end 43 and the outboard end 41, the driver plate 44 and the striker plate are uncoupled from the housing enabling the sliding movement of both and thereby effect the inboard and outboard movement of the striker plate 20. Therefor, forces applied to the striker 18 will not be converted to

movement of the driver plate 44. The S-shaped profile of the cam slot 42 prevents impact forces from being transmitted to the actuator 16. Impact loads are ultimately transmitted to the vehicle. The result is the actuator 16 being insulated from impact forces exerted on the striker 18.

5 The invention has been described in an illustrative manner, and it is to be understood that the terminology, which has been used, is intended to be in the nature of words of description rather than of limitation. Many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that the invention may be practiced otherwise than as specifically
10 described.

WHAT IS CLAIMED IS:

1. A power striker mechanism comprising:
a housing,
a striker mounted on a striker plate, said striker plate mounted on said housing
5 for sliding movement between an inboard and an outboard position;
a driver plate mounted to the housing for sliding movement in a direction
orthogonal to said sliding movement of said striker plate and operably connected
therewith in a camming relation, and
an actuator operatively engaging said driver plate for effecting movement
10 thereof to thereby effect movement of said striker plate between said inboard and
outboard positions, said camming relation comprising end phases corresponding to
said inboard and outboard positions wherein said striker plate and said driver plate are
coupled to the housing and comprising an intermediate phase intermediate said end
phases wherein said striker plate and said driver plate are uncoupled from said
15 housing enabling said sliding movement of said striker plate and said driver plate.
2. A power striker mechanism as claimed in claim 1 wherein one of said striker
plate and said driver plate has a pin and the other of said striker plate and said driver
plate having an S-shaped slot, said pin in sliding engagement with said S-shaped slot,
20 said S-shaped slot having end regions extending in said orthogonal direction and
interconnected by a diagonally extending section, whereby when said pin is in said
end regions of said S-shaped slot, forces imparted to the striker are transmitted to the
housing and when said pin moves along said diagonally extending section, said driver
plate effects movement of said striker plate.
- 25 3. A power striker mechanism as claimed in claim 2 wherein said driver plate is
in a geared relation with said actuator.
4. A power striker mechanism as claimed in claim 3 wherein said driver plate has
30 a series of teeth and said actuator has a drive gear in driving engagement with said
series of teeth of said driver plate.

5. A power striker mechanism as claimed in claim 4 wherein said housing has a sector gear mounted thereon, said sector gear operably extending between said series of teeth of said driver plate and said drive gear of said actuator.

5

6. A power striker mechanism as claimed in claim 5 wherein said housing comprises a backplate engaging a cover plate defining a cavity therebetween, said backplate having an aperture receiving said pin, said cover plate having an aperture through which said striker extends, said cavity having bushings defining a first slide channel, said striker plate slidably received in said slide channel.

10

7. A power striker mechanism as claimed in claim 6 wherein said housing further comprises a driver housing engaging a driver cover defining a cavity therebetween, said driver cover having an aperture receiving said pin, said driver housing having an aperture providing access for said operative engagement between said drive plate and said actuator, said cavity having bushings defining a second slide channel, said drive plate slidably received in said slide channel.

15

8. A power striker mechanism as claimed in claim 7 wherein said driver cover and said backplate engage in a back to back relation with said respective apertures aligning enabling said pin to extend therethrough.

20

9. A power striker mechanism as claimed in claim 1 wherein said housing comprises a backplate engaging a cover plate defining a cavity therebetween, said backplate having an aperture receiving said pin, said cover plate having an aperture through which said striker extends, said cavity having bushings defining a first slide channel, said striker plate slidably received in said slide channel.

25

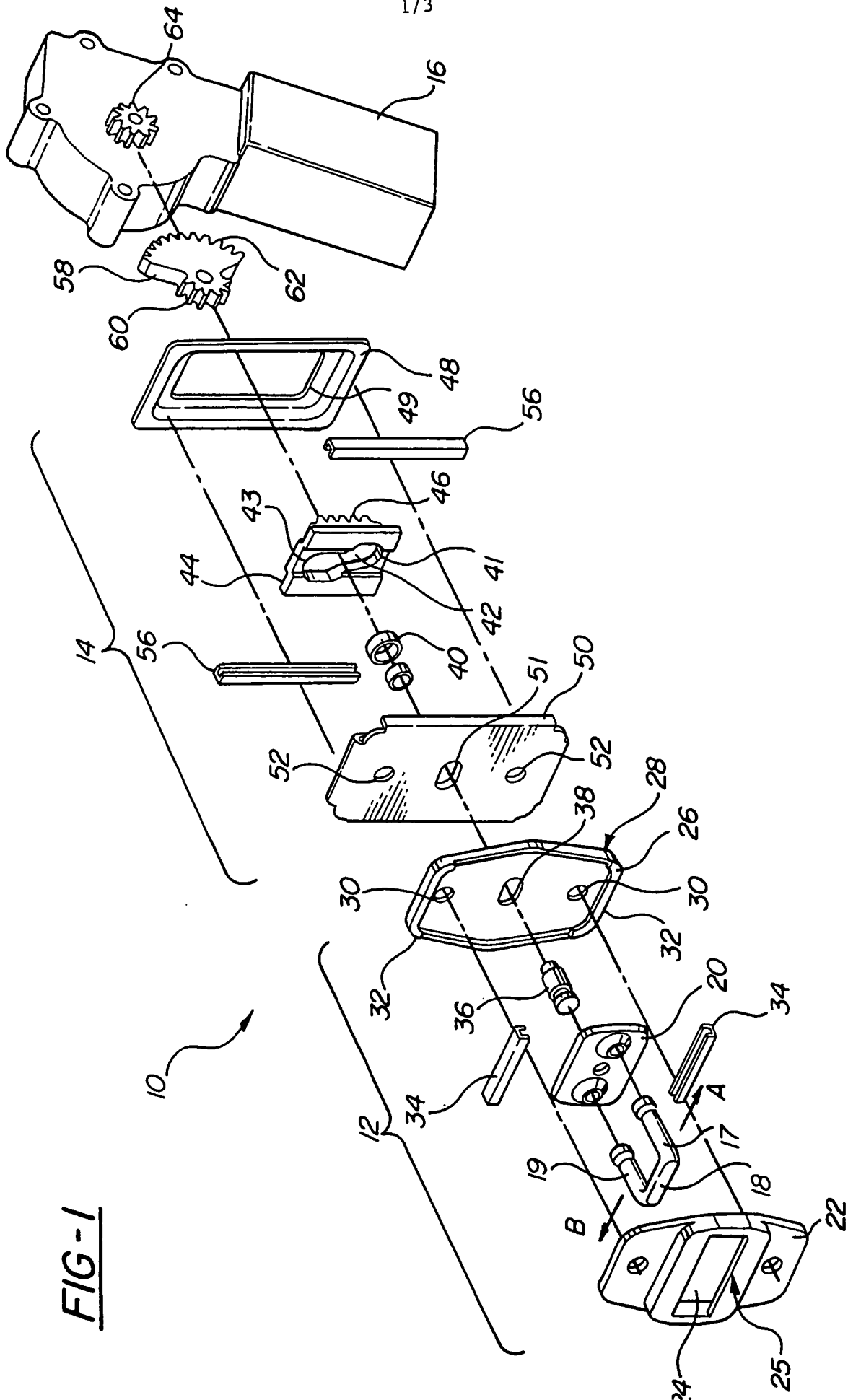
10. A power striker mechanism as claimed in claim 9 wherein said housing further comprises a driver housing engaging a driver cover defining a cavity therebetween, said driver cover having an aperture receiving said pin, said driver housing having an

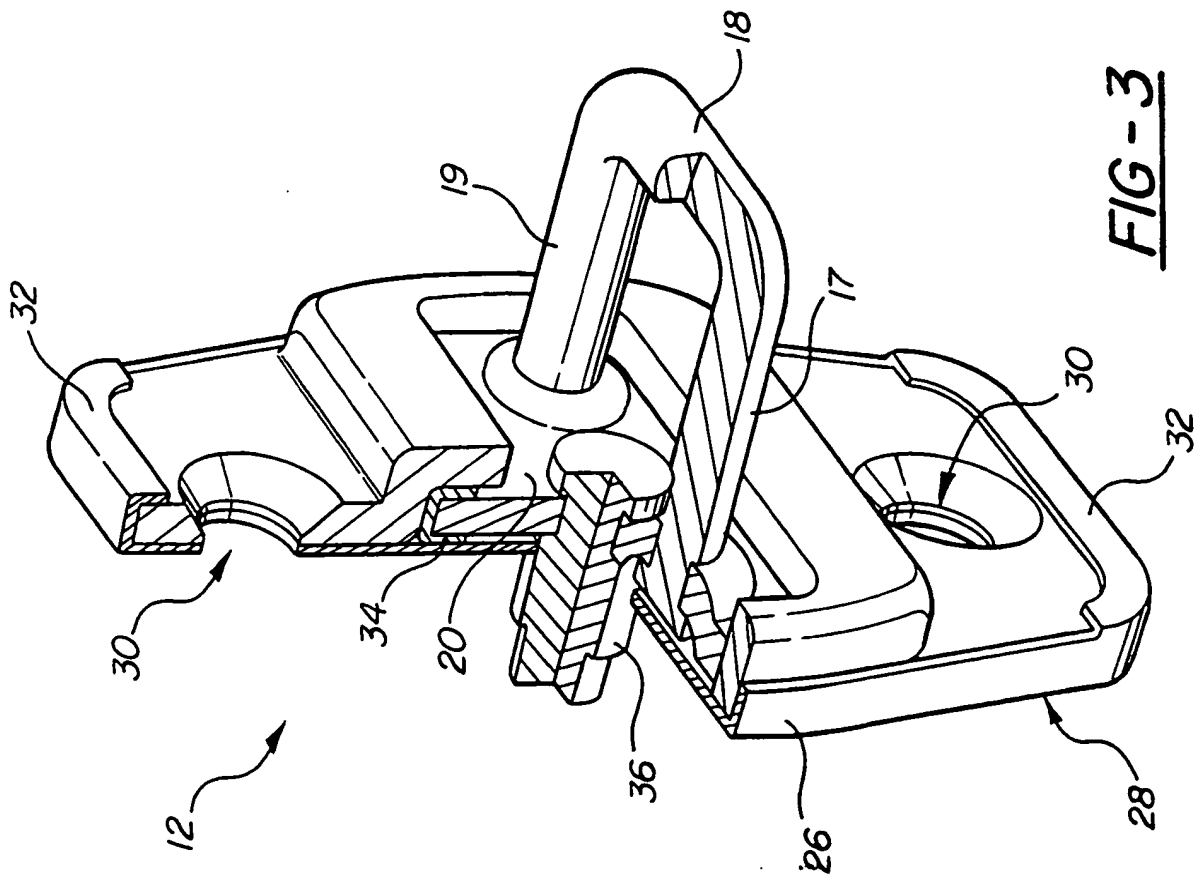
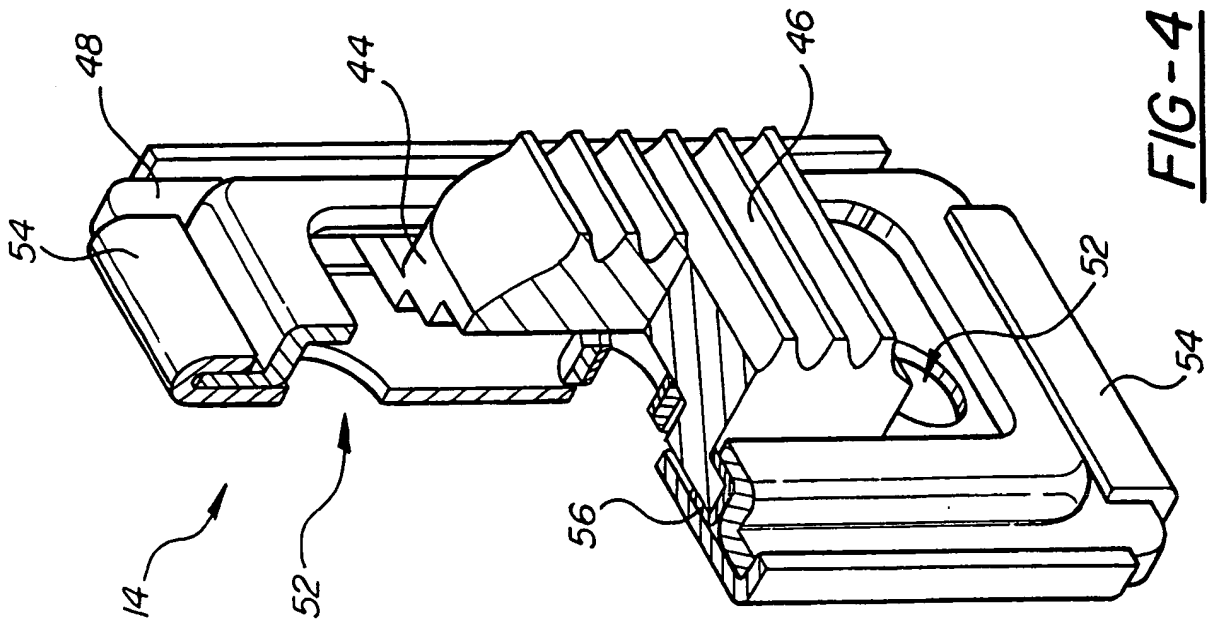
30

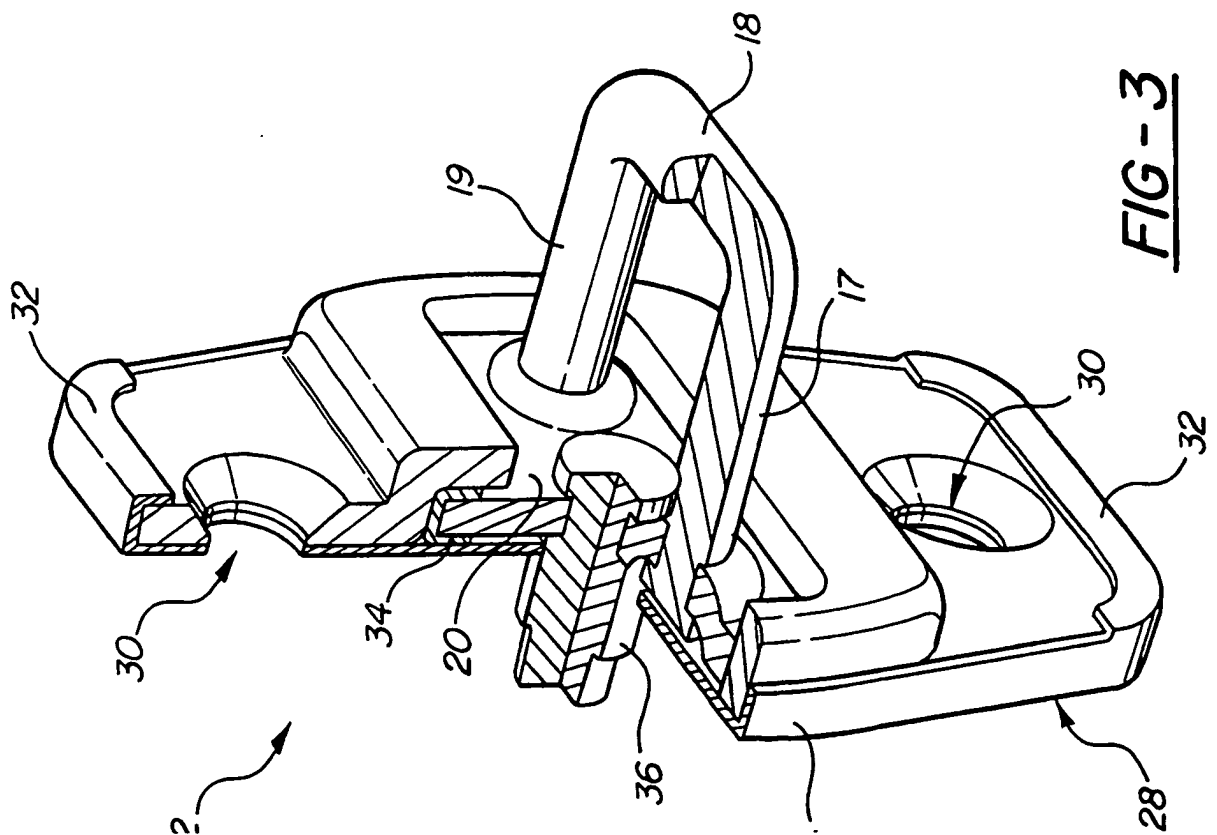
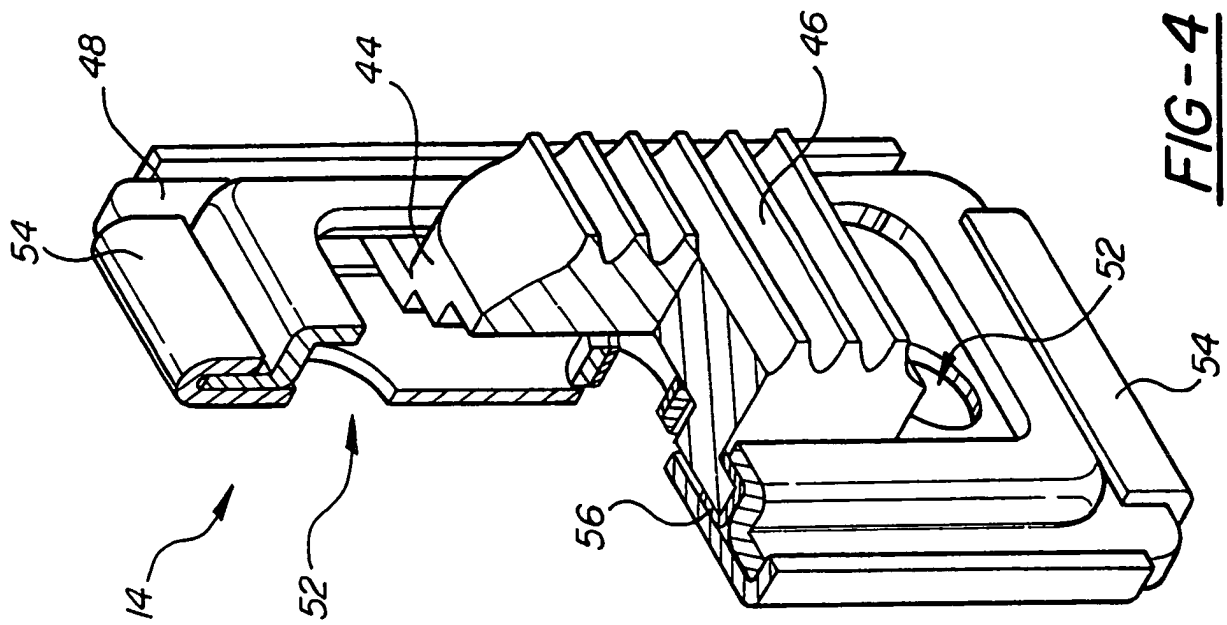
aperture providing access for said operative engagement between said drive plate and said actuator, said cavity having bushings defining a second slide channel, said drive plate slidably received in said slide channel.

- 5 11. A power striker mechanism as claimed in claim 10 wherein said driver cover and said backplate engages in a back to back relation with said respective apertures aligning enabling said pin to extend therethrough.

1/3







INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 01/00182

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 E05B15/02 E05B47/00 E05B65/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 E05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 869 537 A (COMPEAU ET AL.) 26 September 1989 (1989-09-26) the whole document ---	1-3
A	US 5 938 254 A (WEYERSTALL) 17 August 1999 (1999-08-17) the whole document ----	1, 3, 9
A	US 4 982 984 A (YOKOTA ET AL.) 8 January 1991 (1991-01-08) cited in the application the whole document ---	1, 3, 9
A	US 4 707 007 A (INOH) 17 November 1987 (1987-11-17) the whole document ---	1, 3, 9
	--- -/--	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *G* document member of the same patent family

Date of the actual completion of the international search

6 July 2001

Date of mailing of the international search report

12/07/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

Westin, K

BEST AVAILABLE COPY

INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 01/00182

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>PATENT ABSTRACTS OF JAPAN vol. 015, no. 212 (M-1118), 30 May 1991 (1991-05-30) -& JP 03 059276 A (HONDA MOTOR CO LTD; OTHERS: 01), 14 March 1991 (1991-03-14) abstract; figures -----</p>	1,3,9

BEST AVAILABLE COPY

INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA 01/00182

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4869537 A	26-09-1989	CA 1320057 A DE 3900508 A GB 2213866 A,B JP 1214281 A	13-07-1993 03-08-1989 23-08-1989 28-08-1989
US 5938254 A	17-08-1999	DE 19737996 A JP 10121797 A	23-04-1998 12-05-1998
US 4982984 A	08-01-1991	JP 1151675 A JP 2014442 C JP 7035709 B JP 1151676 A JP 1151677 A JP 1151678 A	14-06-1989 02-02-1996 19-04-1995 14-06-1989 14-06-1989 14-06-1989
US 4707007 A	17-11-1987	JP 61183588 A CA 1266070 A	16-08-1986 20-02-1990
JP 03059276 A	14-03-1991	NONE	

BEST AVAILABLE COPY